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(19) (CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) System for Selective Treatment of a Traveling Paper Web

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(57) 14 Claims

Notice: This application is as filed and may therefore contain an incomplete specification.



SYSTEM FOR SELECTIVE TREATMENT
OF A TRAVELING PAPER WEB

5 The invention concerns a system for selective treatment of a traveling paper web by coating or impregnating in in-line arrangements.

10 Voith Product Brochure P 2771 discloses a so-called "Speedsizer" wherein the coating mixture is applied on both sides of the web simultaneously (Figs. 2 through 8) In all of these illustrated embodiments, the web sections (paper trains) still
15 are relatively long. This is evident especially in Fig. 8, which shows the retroactive installation of a coater for double-sided application of the coating mixture in an existing paper machine. The coater is followed by
20 noncontact dryers arranged on both sides of the web, which necessitates an overall arrangement extending all the way into the basement. In addition to long paper trains, this variant entails disadvantages also in view of the necessary construction measures and tending
25 options.

 DE 43 13 628, which corresponds to co-pending U.S. Patent Application Serial No. 08/229,173, involves long web sections and coaters and noncontact dryers that extend upwardly. The same
30 disadvantages are present as in the aforementioned Voith Product Brochure.

 Therefore, it would be desirable to have
 a system where the surface
35 treatment with a coating liquid, or impregnating, of a traveling paper web, can be performed with little expense, where the coaters required for

5 in existing dryer sections of a paper machine while nonetheless requiring only limited overall space, limited overall length, providing good tending options from the paper machine floor, and involving maximally short paper trains for the drying process. Additionally, the short unsupported paper trains are meant to enable a high runability, notably with high speeds and low web strengths.

Accordingly, in one of its aspects, the present invention provides a system for selective treatment of a travelling web of paper or cardboard by surface coating or impregnation in a dryer section of a paper machine, said system comprising:

a first coater installed in said dryer section and positioned to coat one side of the web, said coater being of the type that indirectly coats the coating on the web;

said dryer section including a first dryer group and a second dryer group, said first coater being disposed after said first dryer group;

a second coater positioned to coat the other side of the web installed in said dryer section and positioned after said first coater and before said second dryer group; and

first and second web deflectors installed in said dryer section and positioned respectively after said first and second coat-ers.

Applicant has discovered that this objective may be achieved by providing first and second dryer groups as well as first and second coat-ers to coat opposite sides of the web wherein the first coater is positioned after the first dryer group and the second coater is positioned before the second dryer group. Web deflectors follow the coat-ers.

According to the invention it is possible to retrofit an existing conventional dryer section with coaters and noncontact dryers for surface treatment of the traveling paper or cardboard web. It is possible as well to make use of the invention in the construction of a new paper machine.

The dryer section may be one as described, e.g., in DE 4 328 554 and consists of single-row dryer groups each with a single endless felt. Following the last single-felt dryer group is at least one dual-felt dryer group with several lower cylinders and several upper cylinders and with one upper felt and one lower felt. The dryer groups may be configured, if desired, in three rows or set obliquely, in so-called V-form.

The first coater to be installed is arranged preferably behind a double-row group of drying cylinders. The advantage of this is that the web

can enter the first coater, if desired, with a final moisture content of, e.g., only 2%.

When a surface treatment or impregnation of the web is not desired, the present system

5 also enables at times the nonuse of the coaters integrated in the dryer section, where the path of the web may remain nearly unaltered. In such case, the afterdryer section may be utilized to increase the operating speed. This is possible because (without coating) less moisture must be removed from the web.

Overall, only a few drying cylinders, for example three, need to be removed, if coaters are installed into an existing dryer section.

15 The path of the paper web need not depart at any point from the normal space of the dryer section, so that the coaters can always be tended approximately from the paper machine floor.

20 The advantages resulting from a limited overall length, limited overall space requirements and very short unsupported paper trains are achieved by the arrangement of the coaters according to the invention, which at separate points treat once the underside and once the top side of the web, and by the arrangement of the following web deflection means, for example deflection rolls or noncontact deflection devices, which operate with unheated or heated air and are known as "air turn" or "air can" deflectors.

25 Noncontact dryers are favorably coordinated with a drying cylinder fashioned as a deflection roll, i.e., the cylinder is preferably unheated. In the prior art, the noncontact dryers were arranged on both sides along the web path and, therefore, caused long paper trains.

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Short unsupported paper trains also allow increased speeds of web travel, without inviting web breaks. In addition, the short unsupported paper trains allow with dry substance contents of the web $\leq 80\%$ idle passage of the application area, when the applicators are not being used.

The invention will be explained hereafter with the aid of pictorially illustrated embodiments.

The above-mentioned and other features and advantages of this invention, and the manner of attaining them, will become more apparent and the invention will be better understood by reference to the following description of several embodiments of the invention taken in conjunction with the accompanying drawings, wherein:

Figs. 1 through 7 are diagrammatic side elevations of various embodiments of dryer sections consisting of several dryer groups and including coaters for treating the paper or cardboard web.

Identical components are referenced identically in the figures, which in the individual figure descriptions will not be addressed in any detail.

Fig. 1 shows three successively arranged double-row dryer groups 10, 11, 12 - so-called double-felt dryer groups - each consisting of lower cylinders 15 with a usual lower felt UF (felt or dryer wire coverings) and upper cylinders 16 with upper felts OF. In other words, Fig. 1 shows a first dryer group 10, a second dryer group 12 and an intermediate dryer group 11. Dryer group 11 may comprise one upper cylinder 16 only;

or at least two upper cylinders 16 and at least one lower cylinder which is not shown. Not illustrated are the drives, since they are of the conventional type.

5 A first coater 35 for treating one side (e.g., underside) of the web 40 is arranged after the first dryer group 10, from which web 40 departs obliquely downward. The coater 35 for one-sided application of a liquid coating mixture
10 is coordinated here with a pair of rolls 1 and 2 forming a press gap. Roll 1 is the applicator roll, which is acted upon by a nozzle applicator 20, while roll 2 is the backing roll.

 Coater 35 is followed by a rotating
15 deflection roll 30 wrapped by web 40 and situated at the level of the lower drying cylinders 15 of first and second dryer groups 10 and 12. Roll 30 may be heated or unheated, may rotate or be stationary. If coater 35 has been mounted into an
20 existing dryer section, roll 30 was previously a heatable drying cylinder.

 As is evident from Fig. 1, the coated side of web 40 is dried, by means of a noncontact dryer system 21 arranged at the periphery of roll 30, to
25 a degree such that thereafter it can be dried further by contact with another upper dryer 16 of dryer group 11. If required, an expander drum may be arranged before or after deflection roll 30.

 Web 40 proceeds then across paper guide rolls
30 22, and from there in an upward direction to the next coater 35' for treatment of its other side, for instance the top side. The web passes in the process again a pair of rolls comprising rolls 1 and 2 and forming a press gap. Coater 35'
35 preferably includes a specific nozzle applicator 20' according to German Patent Application

No. P 44 13 232.8. A further noncontact dryer system 21', on the roll 30', follows coater 35'.

As shown in Fig. 2, it is possible also to use deflection rolls 30, 30' without noncontact
5 dryers 21.

Illustrated in Figs. 3 and 4 is the use of noncontact deflection means, in lieu of deflection rolls 30 and 30', with Fig. 3 showing the "air turn" 39 and Fig. 4 the "air can" 39'. The air
10 turns 39 and air cans 39' are equipped with air nozzles for heated and unheated air, which create an air cushion for web deflection. An air turn issues normally cold air and serves to deflect the web. Operating with heated air, an air can
15 represents at the same time a web deflector and web dryer.

As can be seen from Figs. 1 through 3, further drying of the web 40 may take place in the usual manner in the next or second dryer group 12.
20 Behind that, further coaters may be provided as well.

Similarly to roll 30, deflection roll 30' may be heated or unheated. In the latter case it represents a plain paper guide roll. Roll 30' may
25 rotate or be stationary, the same as roll 30.

Figs. 1 through 4 show additionally, below the coaters 35, 35', catwalks 23 provided with a railing and a collection tub for liquid coating mixture splashes.

Fig. 5 illustrates the retroactive
30 installation of coaters 35, 35' in an existing double-row dryer section. The drying cylinders and guide rolls, which for installation of the coaters 35, 35' had to be removed, are shown in
35 the drawing by broken line. The drive needs to be rearranged in such a way that existing cylinders

15'' and 16'' cylinder can run opposite to the original direction of rotation and will allow separate speed control.

5 The removed drying cylinders 15' have been substituted again by applicator rolls 1 for the coaters 35 and 35' to be installed. Referenced 16'' in Fig. 5 (at coater 35) and 15'' (at coater 35'), an existing drying cylinder each serves as a backing roll. Fig. 5 also shows, by dashed line, 10 the path of web 40 - with the coater 35' unused - when the web is not meant to be routed across paper guide rolls 22.

Two further variants of web threading are illustrated in Figs. 6 and 7, showing that the 15 first coater 35 may follow a single-row dryer group 13 consisting of drying cylinders 17. At the end of this single-row dryer group 13, the paper web 40 may have a residual moisture content between approximately 2% and approximately 6%, 20 depending on applicable operating conditions and type of subsequently applied coating mixture. The dryer group 13 features an endless felt F, which together with web 40 alternates between drying cylinders 17 and deflection rolls 18. It is 25 conceivable to fashion the deflection rolls 18 as suction rolls with external suction box 19.

After the coater 35 and the noncontact dryers 21, the web 40 traverses again a single-row dryer group 14, which resembles the dryer group 13. 30 Paper guide rolls 22 carry web 40 then to the second coater 35' and thereafter to roll 30' with noncontact dryers 21.

Web 40 undergoes subsequently a further drying in a double-row dryer group 12, such as 35 illustrated in Fig. 1.

Fig. 7, in contrast, shows that the application of the liquid coating mixture on the other side of web 40 can take place right after the noncontact drying that was carried out after the first application by coater 35. The second noncontact drying and the contact drying in dryer group 12 occurs then in the same manner as shown in Figs. 1, 2 and 3.

It is possible to delete the noncontact dryer 21, which is suitable when only low coating weights need to be applied.

It is understood that web deflection means 30, 30', 39 and 39' illustrated in Fig. 2 through 4 can each be used in the variants shown in Figs. 6 and 7.

From all of the figures it is evident that the web needs to traverse in each area only very short unsupported paths, which in addition to the previously described advantages results in improved web runability, especially at high speeds and low web strengths. This results from the risk of web breaks is being reduced considerably.

While this invention has been described as having a preferred design, the present invention can be further modified within the spirit and scope of this disclosure. This application is therefore intended to cover any variations, uses, or adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains and which fall within the limits of the appended claims.

WHAT IS CLAIMED IS:

- 5 1. A system for selective treatment of a travelling web of paper or cardboard by surface coating or impregnation in a dryer section of a paper machine, said system comprising:
- a first coater installed in said dryer section and positioned to coat one side of the web, said coater being of the type that indirectly coats the coating on the web;
- 10 said dryer section including a first dryer group and a second dryer group, said first coater being disposed after said first dryer group;
- a second coater positioned to coat the other side of the web installed in said dryer section and positioned after said first coater and before said second dryer group; and
- 15 first and second web deflectors installed in said dryer section and positioned respectively after said first and second coaters.
- 20 2. The system of Claim 1 wherein at least one of said deflectors is a drying cylinder configured as a deflector roll.
3. The system of Claim 2 wherein said second coater is positioned immediately after said first deflector.
- 25 4. The system of Claim 2 including noncontact dryers operatively associated with said drying cylinder.
5. The system of Claim 4 wherein said second coater is positioned immediately after said first deflector.
- 30 6. The system of Claim 1 wherein at least one of said web deflectors is a noncontact deflector.
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7. The system of Claim 1 wherein at least one of said dryer groups is of double row configuration comprising upper cylinders arranged in an upper row and lower cylinders arranged in a lower row, and wherein at least one of said
5 coaters is disposed in a level between said upper and lower rows.

8. The system of Claim 7 wherein at least one of said coaters is arranged directly between a
10 last cylinder positioned in one of the upper and lower rows and a web deflector positioned in the level of the other of said upper and lower rows.

9. The system of Claim 7 wherein at least one of said coaters is arranged directly between a
15 web deflector positioned at the level of one of the upper and lower rows and a web deflector positioned at the level of the other of said upper and lower rows.

10. The system of Claim 1 wherein at least one of said dryer groups is of single row
20 configuration and at least one of said coaters is disposed at about the level of the drying cylinders of said single row group.

11. The system of Claim 1 wherein said
25 coaters, said deflectors and said noncontact dryers are retrofit in an existing dryer section, said deflectors operating in noncontact fashion.

12. The system of Claim 11 wherein existing
30 cylinders of said existing dryer section are associated with respective said coaters as a backing roll, and said coaters each include an applicator roll that forms a press with one of said cylinders.

13. The system of Claim 1 including at least
35 one coater in said dryer section that may temporarily be idle.

14. The system of Claim 1 wherein said second coater is disposed between an intermediate dryer group and said second dryer group.

ABSTRACT OF THE DISCLOSURE

In a system for selective treatment of a traveling web, preferably of paper or cardboard, by surface treatment or impregnation. At least one coater is in the case of web treatment arranged after a dryer group for treatment of the one side of the web. At least one further coater for treatment of the other side of the web is arranged before a further dryer group. Means for web deflection are arranged after the coaters. The coaters deflection systems operating in noncontact fashion, and noncontact dryers can be installed retroactively in existing dryer sections.

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Fig.1

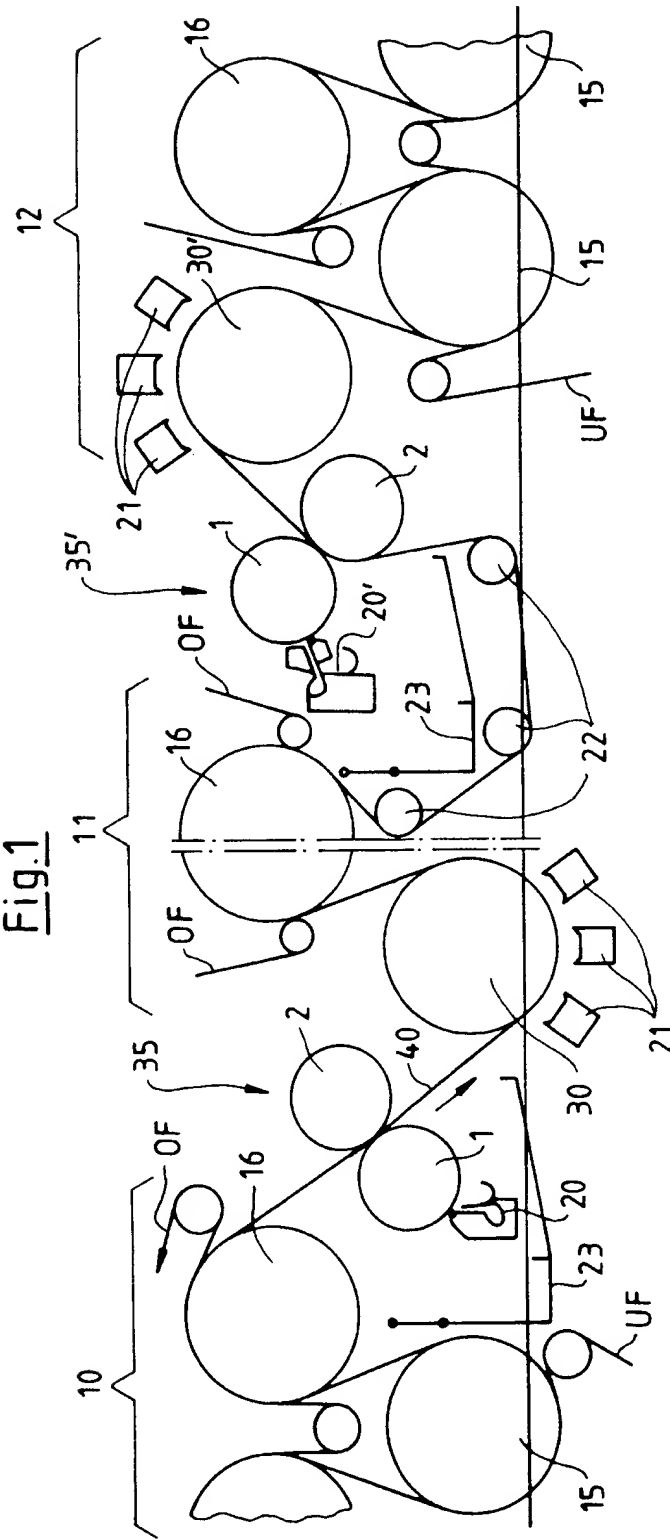
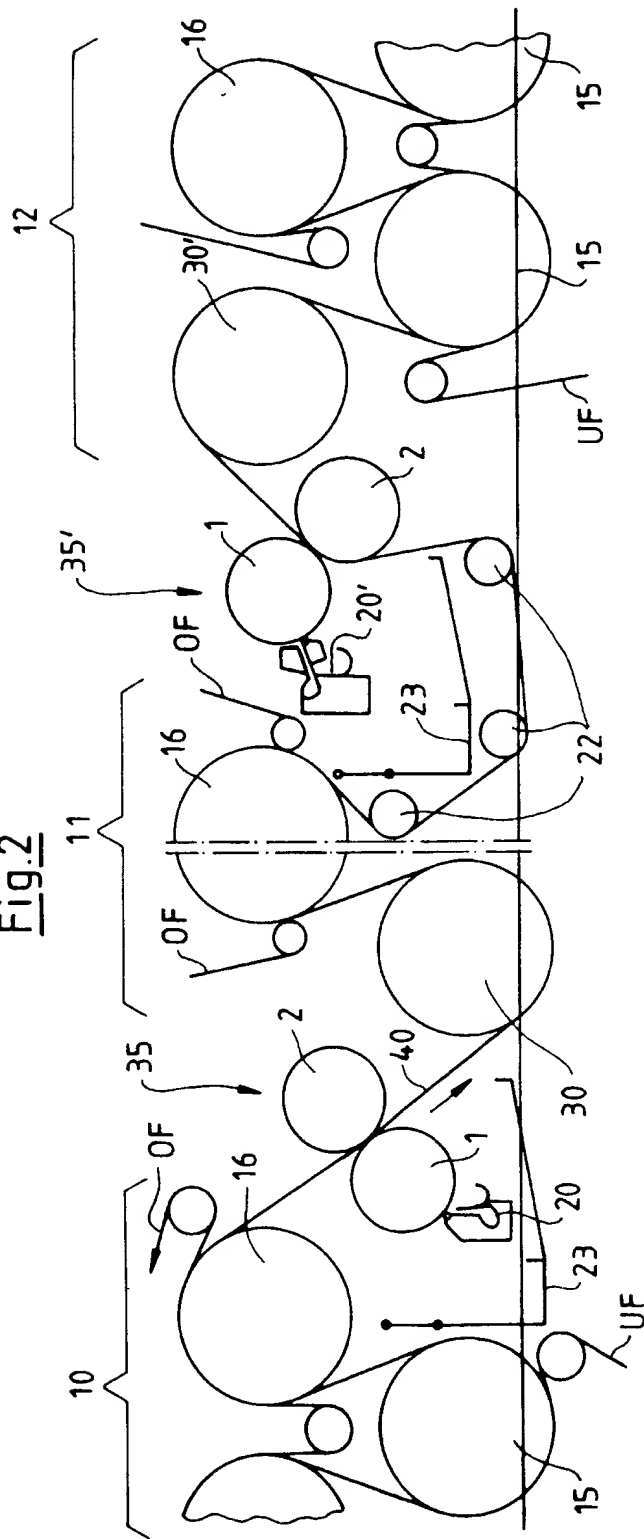


Fig.2



3/6

Fig.3

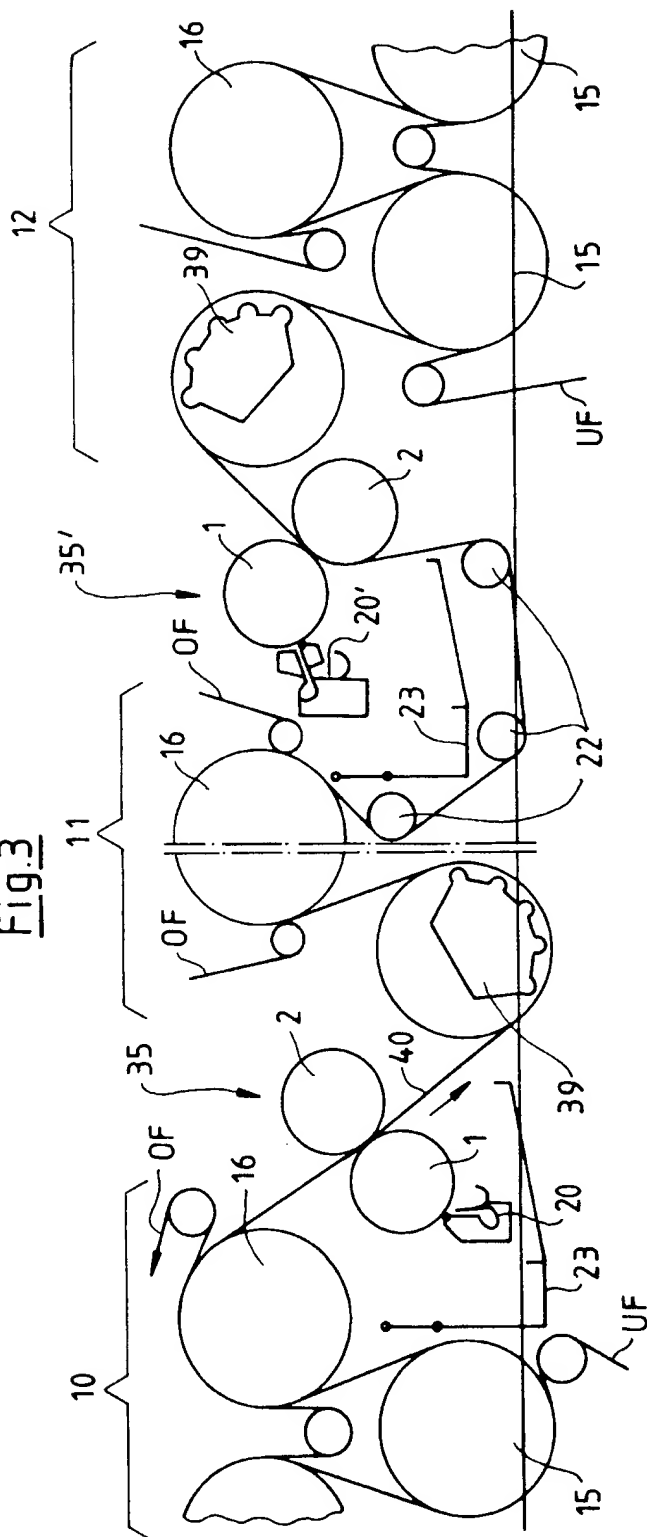


Fig. 5

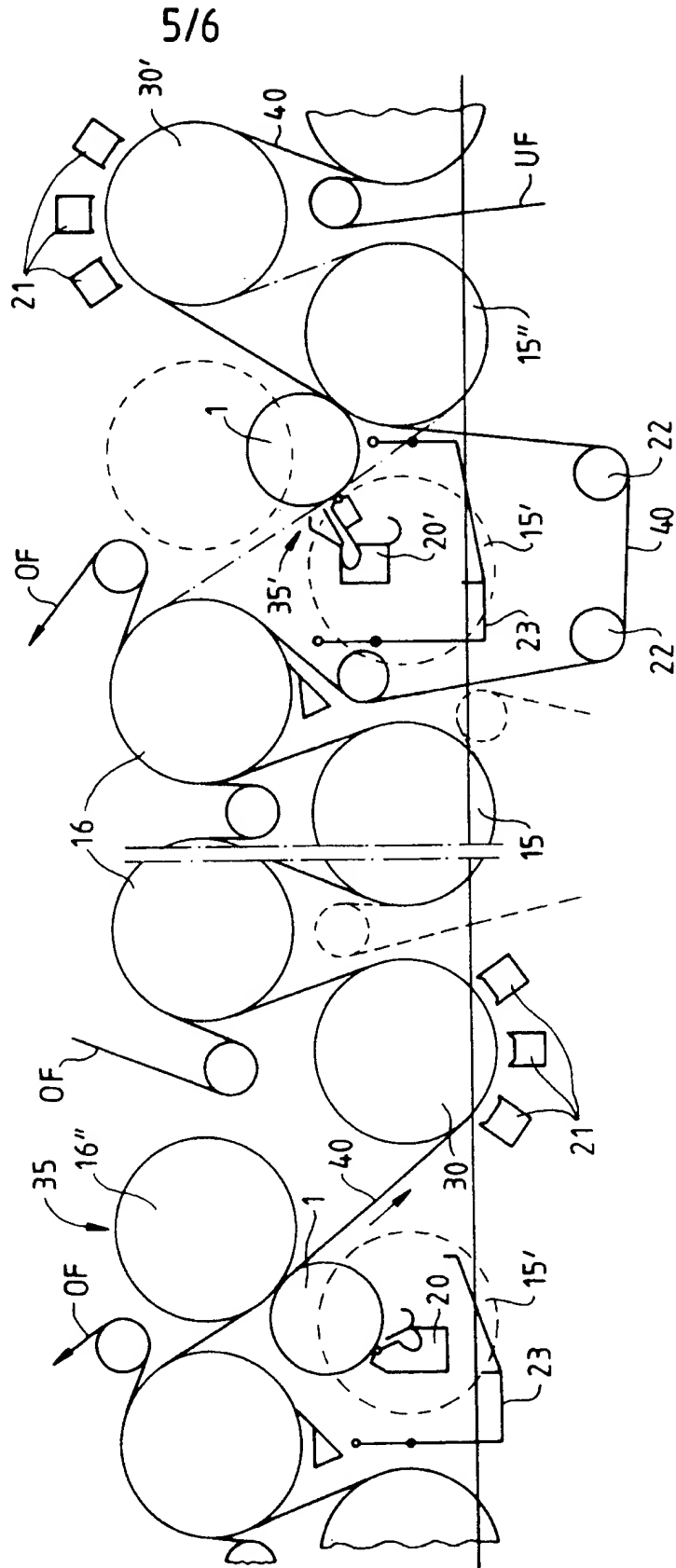


Fig.6

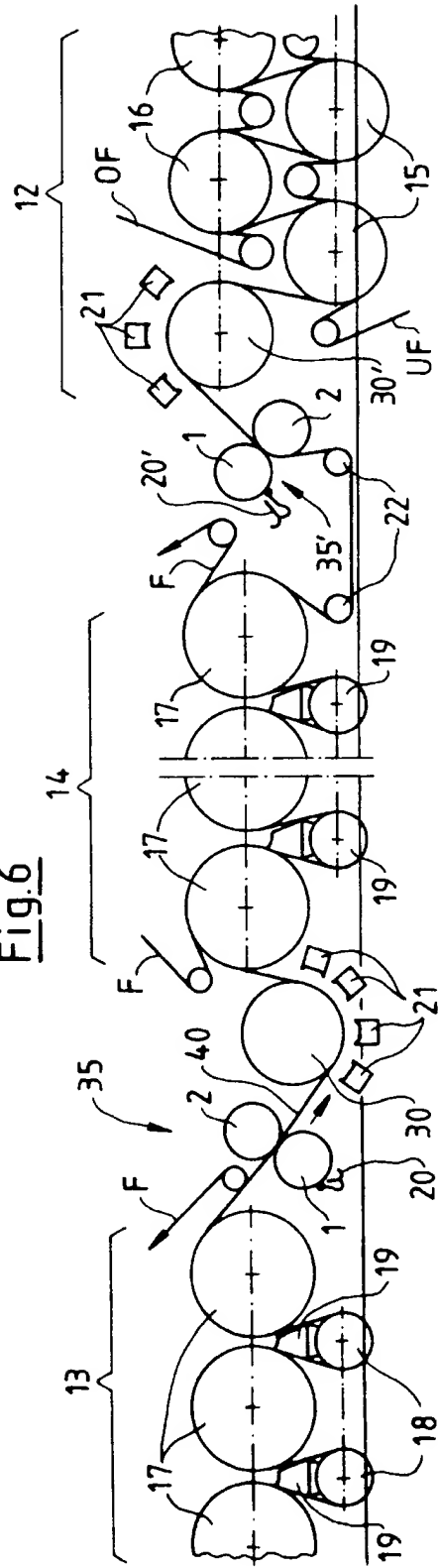


Fig.7

